PETRO-CHEMICAL SYSTEMS, INC. (TURTLE BAYOU) TEXAS

EPA ID# TXD980873350
Site ID: 0602957

EPA REGION 6
CONGRESSIONAL DISTRICT 36
Liberty County

Other Names:
Turtle Bayou
Raji Josiam, (214) 665-8529

Updated: June 2013

Background

The Petro-Chemical Systems, Inc. Superfund Site (Site) is located on County Road 126 or CR 126 (previously known as Frontier Park Road or FPR), south of Liberty (east of Houston and FM 563; 7 miles north of I-10), Liberty County, Texas. CR 126 traverses the site. Site operations commenced prior to 1970 and continued until the late 1970s. Waste oils were dumped on CR 126 and into unlined waste pits along road. A conditional commercial permit was issued 1971 but was revoked due to legal action and withdrawn 1974. After 1974, the land was developed and subdivided into residential properties. In 1986, EPA installed a fence and conducted site sampling. In 1988, CR 126 was excavated, back-filled, and re-built; residents were relocated during this period.

Resurfaced Road

Monitoring Wells installed in MW-109 Area

Current Status and Issues

- With the cleanup actions described above, the EPA has greatly reduced the potential for accidental contact or exposure to contaminated soil and dust along CR 126 while cleanup actions are being designed.

- What is the status of remedial action at Petro-Chemical Systems, Inc. site?

  - The areas where remedial actions have taken place or are required are as follows: County Road (CR) 126 (previously FPR), the CR 126 West Area, the West Road Area, the Main Waste Area, the Office Trailer Area, the Easement Area, the Bayou Disposal Area, and the MW-109 area.
  - The Remedial Investigations and Feasibility Studies (RI/FS) for both FPR and Source Control phases (operable units) were initiated in April 1988. The remedy for CR 126 road was completed in 1988. The remedy included excavation of the road's most contaminated soils, placement of these soils in a temporary on-site RCRA storage facility, and paving the road to prevent direct contact with less contaminated soils. The CR 126 remedial action cost for the road was approximately $2 million.

- The remedy for the site's West Road Area, Main Waste Area, Office Trailer Area, and Easement Area has been implemented by Lyondell Chemical Company and Atlantic Richfield pursuant to a Consent Decree. The remedy included the application of various soil and ground water remedial technologies (e.g., soil vapor extraction, in-situ bioremediation). Based on 7+ years of active remediation, attainment of the site's cleanup goals has been determined to be technically impracticable. These affected areas have been purchased by Lyondell to preclude access and residential exposure. Long-term ground water monitoring is taking place to ensure contaminant migration outside these areas does not occur. Approximately $30 million was spent for remedial activities in these areas.
- For the Bayou Disposal Area no removal of the affected soil was required since the soil already met the Amended ROD soil cleanup criteria for non-residential use and institutional controls are in place.
- The remedial action for the CR 126 West Area is complete and included mechanical auger mixing and in-situ chemical oxidation of contaminated soils and groundwater for a cost of approximately $9 million. EPEC Polymers Inc. conducted these activities pursuant to a Consent Decree that was entered on August 21, 2007. Remedial Action construction work in the CR 126 West area was completed in September 2008 and confirmatory samples were taken in October 2008. Confirmatory sampling results confirm that the cleanup goals have been met. Quarterly groundwater monitoring is being implemented. An Interim Remedial Action Report was submitted to the EPA and TCEQ in August 2009.
- Community Involvement:
    - Received couple of calls from citizens in the area in June 2009. The first citizen expressed concern regarding the condition of CR-126. EPA is in the process of getting the road repair under way. The road also serves as a cap for the site. The other citizen called to enquire about contamination level of a property close to the site which is for sale. Based on all the data available thus far the property for sale does not show contamination. Any well installed at the property would need to be located outside the 1000 ft radius from the site.
    - Received a call from a citizen in July, 2009 regarding the bad condition of the road. EPA worked it out with the County such that they were able to assist in making the necessary repairs of the road.
    - EPA has received another call from a citizen in February 2010 regarding the bad condition of the road. The County will be assisting in making the necessary repairs of the road once the weather becomes drier.
    - EPA continues to work with the County to maintain and repair the road as needed.
- The MW-109 area has been characterized for the extent of contamination. The extent of contamination in this newly identified area is localized since previous ground water sampling has shown elevated benzene concentrations in MW-109 but not in the surrounding wells. EPA has an Interagency Agreement in place with the US Army Corp of Engineers (USACE) and is in the process of starting Remedial Design for the MW-109 area. The ESD for the MW-109 area was finalized in September 2010. The plans for the remediation of the MW-109 area will be conducted using In-Situ Chemical Oxidation (ISCO) for an estimated cost of approximately $1.5 million.
- EPA has an Interagency Agreement with the USACE to re-surface CR-126 to meet County Road Specifications for County acceptance and maintenance for an estimated cost of approximately $1.7 million. In addition the outfall under the Turtle Bayou Bridge (TBB) will be evaluated for the need to widen/clear in order to maintain an optimal flow under the bridge for a total estimated cost of under $200,000.
- A meeting and site walk through was held at the site between EPA, USACE, TCEQ, and the Liberty County Commissioner on November 12, 2009. Another site visit/walk through with the contractors was conducted on December 9, 2009 and discussions were also held with the residents of the area. USACE and their contractor have conduced confirmatory sampling in the MW-109 area.
- A Community Open House was held on March 24, 2010 at the First National Bank in Liberty to share information on the MW-109 Area remedial action, the CR-126 road resurfacing, and the TBB outfall flow optimization, which are planned for completion in September 2010.

- USACE's contractors worked on the remedial design and workplan for the MW-109 area remedial action. The Treatability Study for the MW-109 area was completed and confirmatory sampling results have been obtained.
- With two full rounds of chemical injections in the entire MW-109 area and several rounds of injections in the western quadrant of the MW-109 area, the soil remediation goals have not been able to be met. An alternative remedy identified in the 1998 ROD Amendment, soil excavation with ex-situ biotreatment, has been completed and the soil meets the residential and industrial right-of-way cleanup goals. The soils are currently being relocated to the MW-109 Area. Air monitoring is being conducted to ensure the residents and workers are protected. A pre-final inspection of the MW-109 Area is scheduled for August 30, 2010.
- Soil borings were taken along the CR-126 roadway and the soil boring data was evaluated for design recommendations. The design for the CR-126 road resurfacing was completed and approved by the Liberty County Commissioner's Court on June 29, 2010. Ditch clearing and regarding is currently being performed at the site.
- Sediment samples have been taken at the TBB outfall area and the results are being evaluated. Hydraulic analyses of the channel recommend no sediment removal.
- Lyondell's bankruptcy filing has been finalized. EPA and TCEQ met with the Lyondell Custodial Trust Trustee and their contractor on April 14, 2010 at TCEQ to discuss a plan of action going forward on the former Lyondell areas.
- The remedial action at the MW-109 area was completed on August 30, 2010. A site inspection was conducted by EPA, USACE, TCEQ, and USACE's contractors. The remedial action included ISCO and ex-situ biotreatment and the soils meet the cleanup criteria. Three additional ground water monitoring wells have been installed in the area and will be monitored quarterly for two years.
- The CR-126 road resurfacing has been completed on September 28, 2010. A site inspection was conducted by EPA, USACE, TCEQ, Liberty County, and USACE's contractors. The Liberty County Commissioner's Court met on October 26, 2010 and has accepted the road as a County Road and will assume responsibility for operations and maintenance of the road once the signed easements are transferred over to the County. A Memorandum of Agreement between the EPA and Liberty County has been signed on January 21, 2011 for the County to operate and maintain the road.
- EPA issued the ESD on September 23, 2010. An Administrative Record for the ESD was established in early November at the Liberty County Library and at the TCEQ office in Austin. A Notice announcing the availability of the ESD was published in the Liberty Vindicator in early November, 2010.
- EPA issued the Preliminary Close-Out Report for construction completion at the site on September 30, 2010. A notice announcing the Construction Completion at the Site was published in the Liberty Vindicator at the end of November, 2010.
- The final Interim Remedial Action Report for the MW-109 Area has been submitted to EPA and TCEQ for the MW-109 Area and has been approved March 9, 2011.
- EPA has an interagency agreement with USACE to perform the third Five Year Review at the site. USACE's contractor conducted the site inspections along with EPA and TCEQ during the first week of May. The initial draft Five Year Review Report has been submitted to the EPA and TCEQ for review. The Third Five Year Review Report was approved and signed by the EPA on September 16, 2011.
- Lyondell's Trustee and their contractors have installed 15 new monitoring wells and have abandoned 19 monitoring wells as part of the monitoring plan for the TI Zone in September 2010. Lyondell Trustee's contractors have installed 26 additional wells in April-May 2011 to further define the TI Zone. The monitoring results from the newly installed wells have been incorporated in the revised TI Zone document.
- The Remedial Action Report for the Lyondell Trust's properties is finalized and was approved on September 15, 2011.
- The TI Zone document for the EPEC's Far West Road Area has been finalized and the ESD has been signed in August 2012.

- The TI Zone document for Lyondell Trust's properties has been finalized and the ESD has been signed in August 2012.
- EPA and TCEQ visited the Site in September 6, 2012 and met with EPEC's contractor – URS and with Lyondell Trustee's Contractors – ENVIRON. No significant issues were identified. New signs were posted in the Lyondell Trustee properties. Plans for the waste disposal in the different Lyondell Trustee areas and sump water in the Main Waste Area were discussed.
- Eight rounds of quarterly sampling have been completed at the MW-109 Area and the results are being evaluated for additional investigation to be conducted in the area.
- One newly installed well nest (EMW-044 and EMW-045) in the Office Trailer Area outside the TI Boundary had 1,2-dichloroethane (1,2-DCA) and tert-butyl alcohol (TBA) above their cleanup standards in the 2012 4th quarter sampling. Further investigation is being conducted in this area by Lyondell Trustee's Contractors.
- EPEC and Lyondell Trustee's Contractors continue with the ground water monitoring as per the long term monitoring plan.

Benefits

- Local residents and businesses in the site area are now safe from direct contact and dust inhalation of CR 126 wastes.
- Remedial activities are cleaning the site to be fully protective for those living on the site now or in the future.

National Priorities Listing (NPL) History

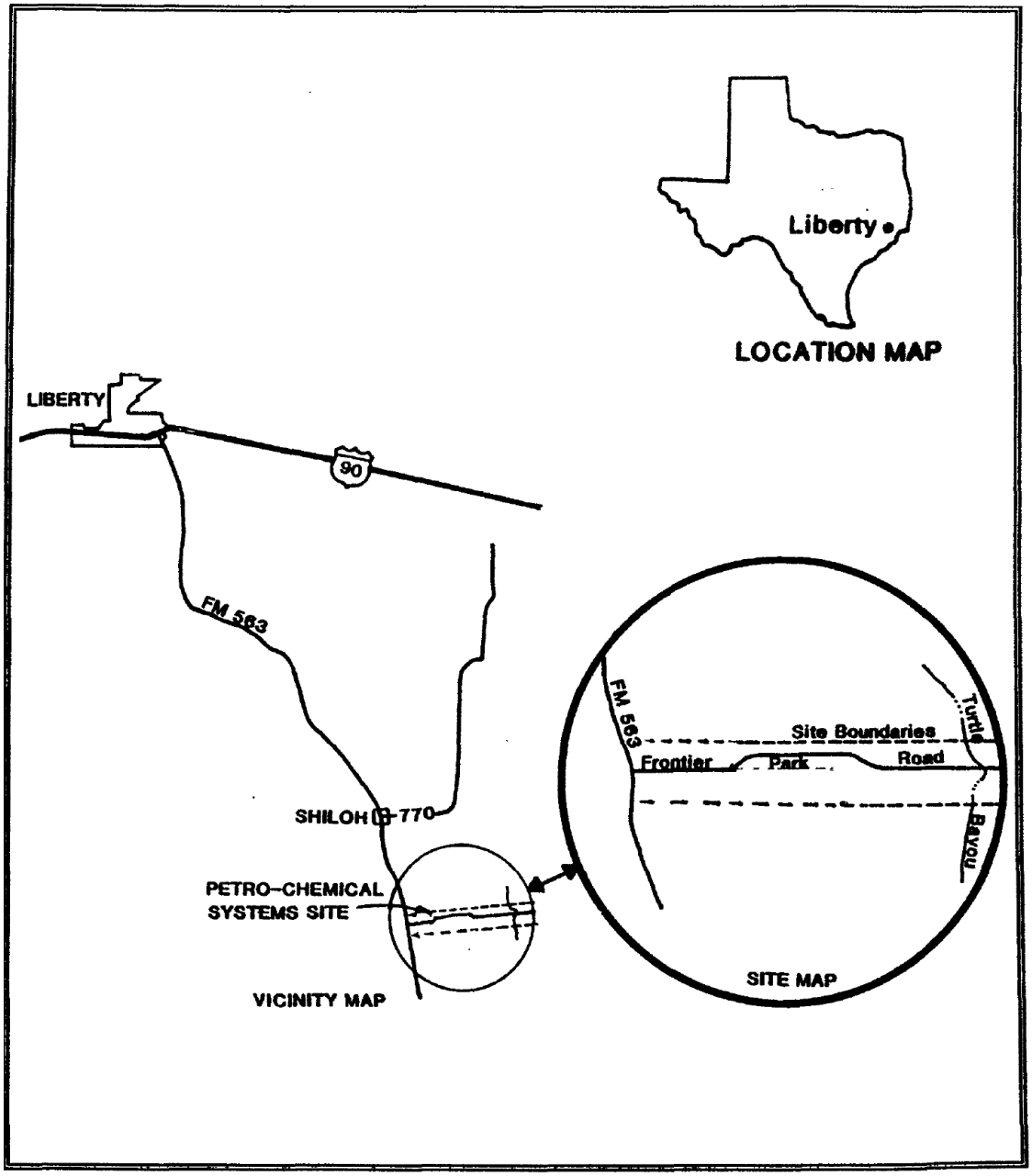
NPL LISTING HISTORY
Site HRS Score: 29.94
Proposed Date: 10/15/84
Final Date: 5/20/86
NPL Update: No. 2

Population: ●There are residences and drinking water wells within a one-mile radius of the site along FM 563 and CR 126.

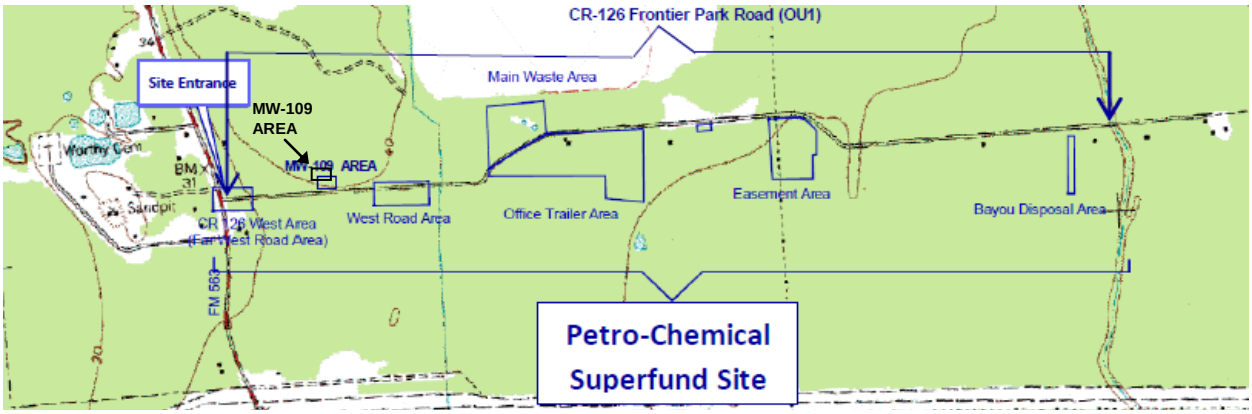
Setting: ●Of the 500+acre tract, 6 disposal areas have been identified.
● Contaminated waste oils were used as dust control along CR 126.
● In addition to CR 126, areas identified on the site include the CR 126 West Area, West Road Area, Main Waste Area, Office Trailer Area, Easement Area, and the Bayou Disposal Area. An additional area, the MW-109 area, is currently being evaluated for extent of contamination

Hydrology: ●The site is characterized by recent alluvial deposits, which overlay Texas Coastal Plain deposits.
●The water table is at 18 to 25 feet below the surface of the site.
●The east end of the site falls within the 100-year flood plain along the Turtle Bayou tributary.

Site Map and Diagram



Petro-Chemical Systems Inc. Superfund Site Location



Petro-Chemical Systems Inc. Superfund Site Map

Wastes and Volumes

- The principal pollutants at the site, by areas of concern, are:

Road:	o Naphthalene	1100 ppm soil composite
	o Chrysene	8 ppm
	o Fluorene	200 ppm
	o Benzene	2000 ppm
Surface Soil:	o Benzene	Up to 7,000 ppm
	o Naphthalene	Up to 6,700 ppm
	o Lead	Up to 5,000 ppm
Groundwater:	o Naphthalene	13,000 ppm
	o Styrene	660 ppm
	o Benzene	480 ppm

- Waste volumes at the site include approximately 5,900 cubic yards in the road area and 300,000 cubic yards in the remainder of the site.

The Remediation Process

Health Considerations:

- Ground water contamination has been detected.
- The Agency for Toxic Substances and Disease Registry (ATSDR) has indicated that no immediate health threat is posed.
- All areas of apparent waste disposal have been identified.

Other Environmental Risks:

- Numerous shallow wells, approximately 25 ft. deep, are a current source of drinking water for the rural area.
- However, all wells currently used on the site are screened in the deeper aquifer at depths of approximately 180 feet or more.

Enforcement

- During the course of the original RI/FS, a supplemental RI/FS was conducted by ARCO under an Administrative Order on Consent signed 3/6/91.
- In May 1993, Special Notice Letters were sent to eight parties to conduct the RI/FS.
- After a failed attempt to negotiate a Consent Decree with site PRPs, a Unilateral Administrative Order (UAO) was issued to Potentially Responsible Parties (PRPs) in December 1993. ARCO Chemical Company and Atlantic Richfield Company are the only PRPs currently implementing work required by UAO.
- A Consent Decree between EPA, Lyondell (formerly ARCO Chemical), and Atlantic Richfield has been entered with the Eastern District Court of Texas by the Department of Justice. The Consent Decree was lodged by the court on December 8, 1998.
- A Consent Decree between EPA and EPEC Polymer Inc. was lodged in the Eastern District Court of Texas court on March 20, 2007 by the Department of Justice. The Consent Decree was entered by the court on August 21, 2007.
- Pursuant to the Lyondell Bankruptcy, the Consent Decree between EPA, Lyondell (formerly ARCO Chemical), and Atlantic Richfield was amended and entered by the court on June 13, 2012 in which the Lyondell Environmental Custodial Trust is substituted for Lyondell Chemical Company as a party under the 1998 Consent Decree.

Record of Decision

Signed: March 27, 1987 (FPR)
Signed: September 6, 1991
(Source)
ROD Amendment: April 30, 1998
(Source & Ground Water)
ROD Amendment: September 22,2006
(Source & Ground Water)
ESD MW-109 Area: September 23, 2010
(Source)
ESD CR 126 West Area: August 17, 2012
(Groundwater)
ESD Lyondell Properties: August 22, 2012
(Groundwater)

Frontier Park Road (CR 126):

- The Record of Decision (ROD) for FPR called for excavation of soil on and around the road followed by placement of the contaminated soil within a temporary on-site RCRA storage facility with temporary relocation of residents.
- This remedy includes mowing of the temporary RCRA storage facility and road area, visual inspections, and disposal of leachate.

Source Control:

- The Source Control ROD selected soil vapor extraction and catalytic oxidation of organic

contamination and includes cap and slurry walls around waste disposal areas. To address ground water contamination, soil sparging with extraction and treatment of contaminated vapors was identified. As a result of extensive field pilot study activities conducted during the remedial design, additional soil and ground water remedy enhancements have been identified. These include in-situ bioremediation of contaminated ground water. To more effectively address soil contamination, the following remedial enhancements were identified: thermal desorption, bioventing, excavation and treatment and/or offsite disposal of site 'hot spots', etc. In 1998, the EPA amended the 1991 ROD to include these and other remedial approaches.

	Other Remedies Considered	**Reason Not Chosen**
	FPR	
1.	"No Action"	Road needs action, too great a threat
2.	Onsite storage with temporary detours	More costly than relocation
3.	Off-site disposal with relocation of residents	Not cost-effective; transportation risks
4.	Off-site disposal with temporary detours	Not cost-effective; transportation risks
5.	Alternative access, Fence contaminated areas	Does not eliminate threat from road
6.	Removal to background levels, temporary detours	Not cost-effective
7.	Surface barrier, temporary detours	Does not alleviate threat from road
	Source Control	
1.	"No Action"	Not protective of human health and the environment
2.	Cap and Slurry Wall	Part of selected remedy
3.	Biological treatment	Short Term Impacts
4.	Solvent extraction	Short Term Impacts
5.	Thermal destruction	Not cost-effective
6.	Thermal stripping	Short Term Impacts
7.	On-site landfill disposal	Short Term Impacts
8.	Offsite landfill disposal	Short Term Impacts
9.	Soil vapor extraction and catalytic oxidation	Part of selected remedy
10.	Ground water extraction (wells), carbon adsorption or direct disposal	May be used, based on pilot study results
11.	Ground water extraction by recovery trenches; carbon adsorption or direct disposal.	May be used, based on pilot study results
12.	Combination of treatment technologies to address various areas of site.	May be used, based on pilot study results

- An Inter-agency agreement was signed with Federal Emergency Management Agency to relocate residents during work on FPR.

ROD Amendments and Explanation of Significant Differences:

The 1998 ROD Amendment addressed a modification to the soil cleanup criteria for benzene identified in the September 6, 1991 ROD. The 1991 ROD"s benzene soil cleanup criteria was based on numerical model predictions of the allowable benzene concentrations in soils that, when attained, would not result in exceeding the federal drinking water standards in the underlying shallow aquifer via leaching. The

benzene soil cleanup criteria modification is based on the following:

X rerunning the numerical model using site specific data (e.g., soil moisture profiles, field permeability test results) collected during the field pilot study activities; and

X consideration of the Texas Natural Resource Conservation Commission"s residential exposure standard for benzene in soil from zero to two feet below ground surface.

All other 1991 ROD performance standards, including the benzene ground water cleanup criteria, remained unchanged.

The 1998 ROD Amendment addressed the remedy for the site's contaminated soils and contaminated ground water. The remedy for the soil contamination addresses the principal threats (i.e., areas of the site where soil is known or suspected to contain high concentrations of dissolved and/or free non-aqueous phase liquid) as well as low level threats at the site by minimizing potential exposure by way of ingestion, inhalation or direct contact with contaminants and by reducing the potential for the contaminated soil to act as a continued source for ground water contamination. The remedy for the ground water contamination addresses the principal risk at the site by minimizing potential exposure by way of direct contact and ingestion with contaminants and by eliminating the potential for migration of contaminants to deeper ground water zones.

The 1998 ROD Amendment enhanced the site's remedy by identifying additional soil and ground water remedy components, which can be used in combination with 1991 ROD, remedy components to achieve the site's performance standards in compliance with all Federal, state and local applicable or appropriate requirements. The identification of the additional remedy components used to achieve the site performance standards is based upon further site characterization, results of field pilot studies, and the ongoing operation of the pilot systems. The additional soil and ground water remedy components include:

X in-situ aquifer bioremediation;

X bioventing;

X aqueous phase soil bioremediation;

X soil excavation and off-site treatment and/or disposal;

X soil excavation and biotreatment;

X thermal desorption;

X soil washing;

X containment (e.g., living cap);

X monitored natural attenuation; and

X institutional controls.

Remedy components identified in the 1991 ROD include:

X soil vapor extraction;

X containment (e.g., traditional synthetic liner cap);

X selected directional containment (e.g., slurry wall);

X installation of storm water management controls;

X monitoring ground water; and

X the restoration of the site surface upon completion of the remedial action.

The primary remedy treatment components addressing site contamination are soil vapor extraction and in-situ aquifer bioremediation. The field pilot studies have shown that a flexible approach is an effective means of addressing the varying geologic conditions at the site and area specific problems. It is anticipated that to attain the performance standards, the use of the various remedy components in succession will be required. The use of multiple remedy components maximizes the efficiency of remedial operations: over time, treatment technologies such as soil vapor extraction become less effective in removing contamination, at which point it is more efficient to change to another, more passive, technology (e.g., bioventing). The transition from one remedy component (e.g., soil vapor extraction) to a subsequent remedy component (e.g., bioventing) will generally be determined by progress sampling. In

general, benzene will be the main chemical of concern; the levels of benzene will be measured over time; a significant decrease in the time rate removal of benzene will indicate a remedy component change. The ROD Amendment describes in more detail the use of various technologies in different areas of the site.

The September 2006 ROD Amendment addresses the following modifications to the previous 1991 ROD and the 1998 ROD Amendment:

1. Documenting that a Technical Impracticability (TI) determination for restoration of portions of the shallow ground water at the site (the S1 sand and the deeper S2 sand) has been made for the site.

2. Expanding the scope of the remediation to include an additional contaminant source area designated as the County Road (CR) 126 West Area (a.k.a. Far West Road Area).

3. Identifying the remedy for the CR 126 West Area.

4. Identifying factors which support granting a TI waiver for the Main Waste Area, the West Road Area, the Office Trailer Area, the Easement Area, and the CR 126 West Area.

5. Presenting MW-109 Area information, although no remedial decisions for this area are being made at this time because further investigations should be conducted.

6. Amending the site's ground water cleanup levels.

7. Amending the site's soil cleanup criteria.

8. Amending the remedy for the Bayou Disposal Area.

9. Amending the remedy for the Main Waste Area's on-site soils vault.

10. Designating that the exact boundaries of the TI Zones will be established after a two-year transitional monitoring period. The two-year monitoring period will also be used to determine whether the selected remedy is effective to prevent contaminants with concentrations exceeding the groundwater protection standards from migrating beyond the S1 and S2 TI zone boundaries

11. Identifying contingency remedies for the site in the event that future groundwater monitoring demonstrates that the plumes of contaminated ground water are expanding in either the S1 or S2 sand. These contingency remedies could be implemented, if necessary, at any of the impacted areas throughout the site**.**

The 2006 ROD Amendment identified the need for further evaluation of the area surrounding monitoring well (MW) 109 (the MW- 109 Area) and the possible need to conduct remedial action in this area. Groundwater sampling of MW-109 conducted during the period of August 2000 through May 2005 found elevated contaminant concentrations of benzene which was previously undetected. Further evaluation in 2007 indicated an estimated volume of impacted soil of 2,388 cubic yards in the MW-109 Area. Due to this increase in contaminated soil volume and the additional costs involved to remediate the MW-109 Area, compared to what was identified in the 2006 ROD Amendment, EPA issued an Explanation of Significant Different (ESD) in September 2010 to document this significant change related to the remedy for the Site. The ESD documents the decision to conduct remedial action of the contaminated soil at the MW-109 Area of the Site using In-Situ Chemical Oxidation (ISCO), which was the remedy selected in the 2006 ROD Amendment, followed by excavation with bio-treatment, which was selected as a remedy for Site contamination in the 1998 ROD Amendment, and to install three new monitoring wells in the MW-109 Area as part of the existing Site groundwater remedy.

Community Involvement

- Community Involvement Plan: Developed 8/85, revised 11/89
- Open houses and workshops: 12/84, 11/85, 3/89, 4/91, 6/91, 2/96, 7/00, 11/00
- Proposed Plan Fact Sheet and Public Meeting: 11/86 (FPR), 6/91 (Source)
- ROD Fact Sheet: 3/87 (FPR), 9/91 (Source), 5/06 (Source and Groundwater)
- Milestone Fact Sheets: 10/86, 7/87, 12/87, 7/88, 1/89, 11/90 (TWC), 05/91, 08/95, 09/99
- Proposed ROD Amendment fact sheet (10/97) and public meeting (11/97), 4/06, 9/07
- Public Open House: (3/24/10) (for MW-109 area remediation, CR-126 Road resurfacing, and Turtle Bayou Bridge Channel Optimization Evaluation)
- Constituency Interest: Site-area residents are concerned about site contamination, property values, and maintenance of CR 126.
- Site Repository: Liberty Municipal Library, 1710 Sam Houston Avenue, Liberty, TX 77575

Technical Assistance Grant

- Letters of Intent Received: None
- Grant Award: N/A
- Current Status: No apparent citizen interest in applying for the grant.

Contacts

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- **State Contact:** (TCEQ) Carol Boucher, (512) 239-2501
- **Attorney:** Anne Foster, (214) 665-2169
- **Prime Contractors:** EA Engineering, Science, and Technology Inc.
  EPA Toll Free Telephone No. 1-800-533-3508

Information Repository

Liberty Municipal Library
1710 Sam Houston Ave.
Liberty, Texas 77575
(936) 336-8901
M-TH: 10:00 am – 6:00 pm;
Fr: 1:00 pm – 5:00 pm
Sa: 10:00 am – 4:00 pm

Texas Commission on Environmental Quality
Records Management Center
Building D, Room 190
12100 Park 35 Circle
Austin, Texas 78753
Phone number 1-800-633-9363 or 512-239-2920
M – Fr: 8:00 am – 5:00 pm